

Field Surveillance

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Section 1 Summary of Inspections, Enforcement, and Public Complaints

1.1 Introduction

The EUB has surveillance and enforcement processes in place to monitor industry's compliance with regulations and requirements and to ensure that consistent enforcement actions are taken for noncompliance. Following is a summary of field inspections and enforcement activities for the 1998/99 fiscal year.

1.2 Inspections

EUB field inspections are prioritized based on weighting of three key criteria, known as OSI: *operator* history, *site sensitivity*, and *inherent* risk of the facility/operation. A review of the regulatory compliance history of operators allows EUB inspectors to focus on those operators with an unacceptable level of unsatisfactory inspections, including repeat noncompliance. Sensitivity of the area where the operation is taking place is also reviewed and includes items such as proximity to the public or water bodies and areas where there has previously been significant public concern regarding oil and gas operations. The inherent risk of a facility or operation is determined by reviewing specific technical details about the facility, such as well depth, complexity of the operation, and whether the facility is sweet or sour.

The total number of inspections in 1998/99 increased significantly to 7244 from 3838 in 1997/98. The overall percentage of major/serious unsatisfactory inspections remained the same as in the previous year at about 5.6 per cent.

Table 1 summarizes the total number of field inspections that took place in 1998/99 and, where available, the number of serious/major unsatisfactory inspections for each inspection type. Details for each broad inspection area can be found in various sections throughout this report.

Table 1. Field inspections, 1998/99

	Inspections (no.)	Major/serious ¹ unsatisfactory (no.)
Drilling rigs	696	50
Service rigs	392	19
Oil production facilities	3730	137
Gas production facilities	643	25
Pipeline construction/testing	358	8
Pipeline failure inspections	400	N/A
Waste management facilities	14	N/A
Drilling waste management	1011	168 (total unsatisfactory) ²
TOTAL	7244	407

¹ Some inspection disciplines use the term "major"; others use "serious." These should be considered equal as they relate to this report.

² Unsatisfactory drilling waste management inspection results do not distinguish between minor and major; therefore all unsatisfactory inspections are included in this summary.

1.3 Enforcement

The EUB has adopted an enforcement process that sets guidelines for EUB enforcement actions when dealing with regulatory noncompliance. Implementation of this

enforcement process together with surveillance activities safeguards the integrity of the EUB's other core functions.

Initial enforcement is determined by the severity of the noncompliance and is escalated for repeated noncompliance or failure to respond. This enforcement process

- improves EUB staff consistency, efficiency, and effectiveness;
- results in increased public safety, minimizes environmental impacts, and improves conservation;
- helps create a level regulatory playing field for industry; and
- improves EUB and industry accountability.

Companies that fail to meet requirements or follow EUB direction are subject to escalating enforcement consequences. The required response to EUB direction and subsequent continued compliance with regulations result in the company's compliance status reverting back to satisfactory.

The Field Surveillance group has developed generic enforcement ladders so that a firm, fair, and consistent approach is taken for all noncompliance situations. Enforcement actions escalate to a higher level if the industrial operator repeatedly fails to meet EUB requirements.

This new approach is being applied in most areas of field surveillance, as indicated throughout this report.

Table 2 summarizes the oil and gas operations shut down in the 1998/99 fiscal year as a direct result of EUB enforcement action for noncompliance and shows the estimated cost to industry (also see Figure 1). Without compromising its responsibilities, the goal of the field surveillance inspection and enforcement process is to reduce or eliminate the number of suspensions and cost to industry.

1.4 Public Complaints

As the population of Alberta grows and the technical expertise for locating and extracting Alberta's hydrocarbon reserves improves, encroachment of oil and gas facilities in relation to the public increases. The EUB is concerned about any negative impacts the upstream energy industry may have on the public. Therefore, EUB field staff continued to make responding to public complaints a top priority for 1998/99.

1.4.1 EUB Response to Public Complaints about Oil and Gas Facilities

As in previous years, EUB Field Surveillance's goal was to respond to all complaints about oil and gas activity and to follow up to ensure problems were resolved. The aim was to ensure prompt, effective, and lasting resolution of complaints through awareness of EUB expectations and firm enforcement action applied to noncompliant operators.

During the 1998/99 reporting year, the EUB received and responded to 851 complaints, compared to 900 in the previous year. Some complainants reported concerns over more than one issue, resulting in the EUB recording 1053 issues from the 851 complaints, as shown in Figure 2. The number of complaint issues decreased from 1133 in 1997/98 to 1053 in 1998/99. Of the 851 complaints received, 74 were the result of repeat occurrences, compared to 50 in the previous year.

Table 2. Facilities/operations shut down at EUB Field Surveillance request, 1 April 1998 to 31 March 1999

Type	Approximate number of suspensions	Average duration of shutdown	Estimated amount of deferred cash flow ¹ (\$)	Actual cost (\$)	Most common reasons for suspensions
Drilling rigs	50	1.25 hours		17 500	- Failure of blowout preventers to function/accumulator systems - Crew training
Service rigs	19	1.5 hours		7 000	- Failure of blowout preventers to function
Oil production batteries	45	11.9 days	362 780		- Severe H ₂ S emissions, oil spills - Excessive flaring
Gas facilities	9	4 days	490 462		- Severe H ₂ S emissions - Noise
Pipelines under construction	15	3 hours		9 000	- No approvals to construct - Striking other pipelines during construction
Pipelines in operation	127	N/A		N/A	- Corrosion - Unsafe operating conditions
Injection wells, disposal wells	128	Not calculated	N/A	Not calculated	- Failure to submit packer isolation tests
Subtotals			853 242	33 500	
TOTALS	393			886 742	

¹ Table 2 was compiled using data from EUB Field Centres. Where direct estimates were not available from the involved companies, cost estimates were as follows: \$750/hour for drilling rig time; \$300/hour for service rig time; \$110/m³ for value of oil production; \$71/10³ m³ for value of gas production; and \$200/hour for pipeline construction down time.

Costs of suspensions are as supplied by industry where available. Where necessary, costs were calculated from production reports.

Figure 3 illustrates the distribution of complaints received by the EUB's eight Field Centres. This graph also shows the distribution of provincial oil and gas production operations per area. The data indicate that complaints are a function of population density in producing areas and the type of oil and gas operations in each area.

EUB Action

- Analysis of complaint data from 1997/98 indicated that rapidly expanding companies often do not have the infrastructure to properly manage their operations and public relations obligations. The EUB felt strongly that this was not acceptable and relayed the message through industry committees and to individual operators that this was an area requiring attention.

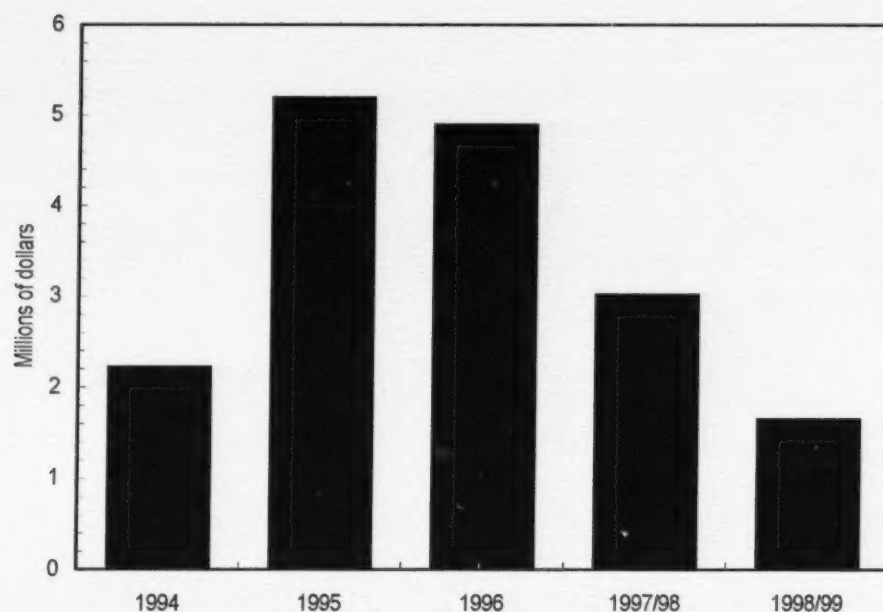


Figure 1. Deferred cash flow and cost to industry due to shutdowns at EUB Field Surveillance request

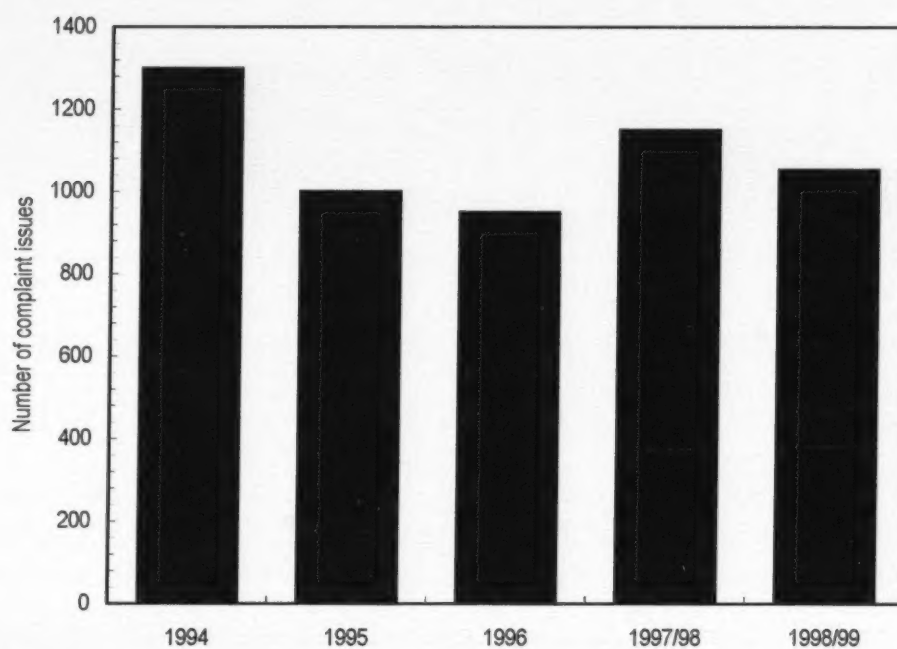


Figure 2. Number of complaint issues recorded

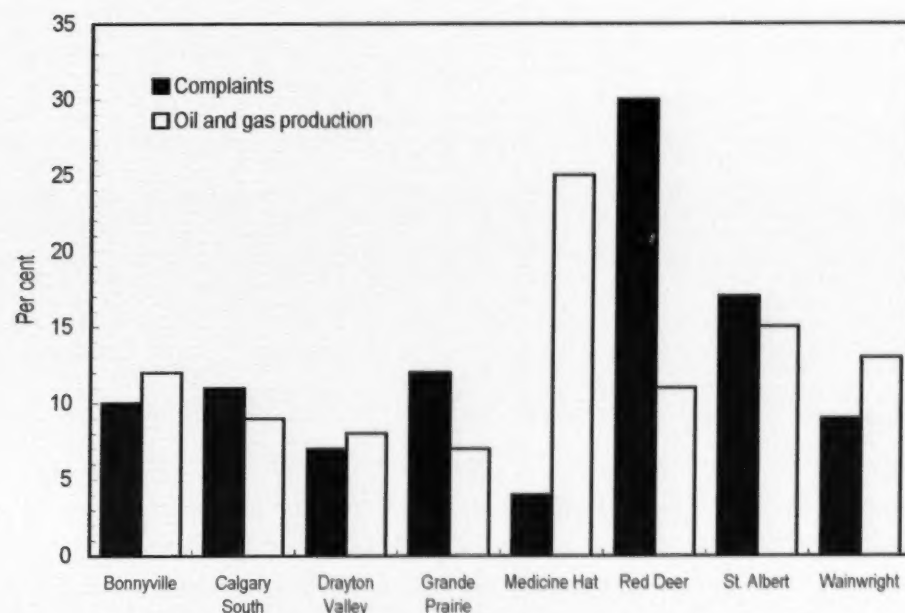


Figure 3. Distribution of complaints and production by Field Centre, 1998/99

- The EUB implemented a random complaint follow-up process in 1998 to gauge the complainant's level of satisfaction with both EUB and industry response to complaints. These data are analyzed to identify if changes are required to complaint response procedures either within the EUB or industry.
- In 1998/99, 20 per cent of complainants were called within a month of filing a complaint with an EUB Field Centre. This percentage of calls will be increased to 50 per cent for 1999/2000.

Results of Public Complaints Follow-up

- 77 per cent of incidents were resolved to the satisfaction of the complainant
- 70 per cent of complainants were satisfied with the response from the company
- 98 per cent of complainants were satisfied with the response from the EUB

1.4.2 Types of Public Complaints

The EUB receives complaints on a variety of issues. Historically, the most common issues have been odours, lease management, public health and safety, and flares, as shown in Figure 4.

The categories of lease management and public health and safety combine similar complaint issues received and recorded by the EUB. For example, lease management combines property damage and lease management concerns. Public health and safety combines issues related to public hazards, health, and water wells. As shown, odour complaints are the most prevalent.

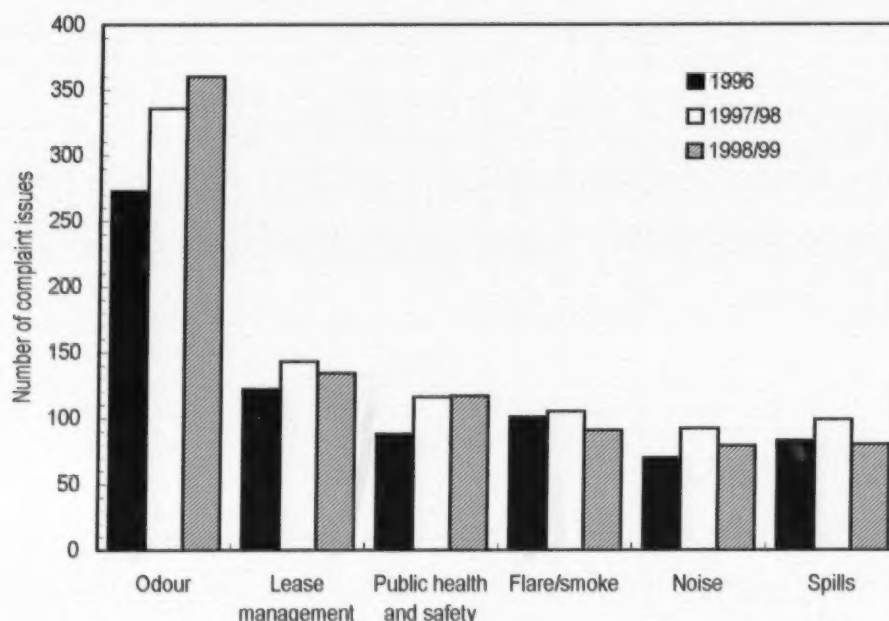


Figure 4. Distribution of complaints by issues

Even though the overall number of complaints decreased from 1997/98, odour complaints increased by 24 complaints, or 7 per cent. Investigations into the odour complaints revealed that the emissions were from a range of sources, as shown in Figure 5. The EUB believes the high percentage of unknown complaints is a result of odours where the sources could not be located. These sources likely originate from truck traffic, intermittent releases of limited frequency, natural phenomena (e.g., swamp gas), and other industrial operations.

One approach that has proven to be effective in addressing concerns is to bring industry and concerned citizens together for the purpose of constructive dialogue. The EUB terms such working groups "synergy groups." Bringing the public and industry together is a good first step towards harmonious coexistence. Currently field staff participate in about 40 such groups throughout the province.

EUB Action

- The increase in odour complaints was regarded as high priority by field staff. As a result of the unacceptably high number, the EUB will continue to work with operators to mitigate these occurrences. Operators failing to respond may be subject to escalating consequences.
- In situations that are conducive to industry-public forums, field staff will continue to encourage and, if necessary, participate in such synergy groups.

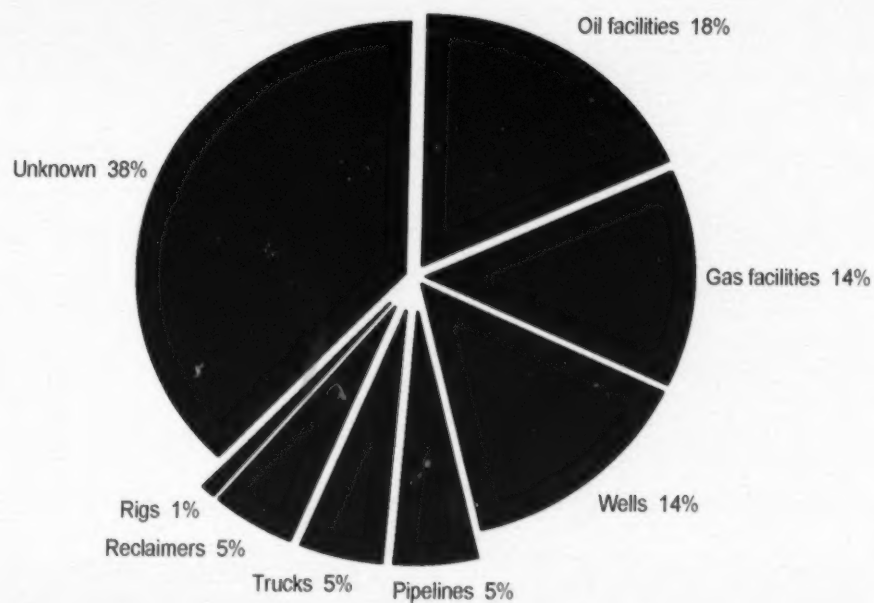


Figure 5. Odour complaints by source, 1998/99

Section 2 Drilling and Servicing

2.1 Introduction

The EUB's regulation of drilling and servicing operations ensures public safety, conservation of resources, and environmental protection. This is accomplished through requirements, compliance inspections, monitoring operator and contractor performance, evaluating incidents, and applying fair and firm enforcement for noncompliance.

2.2 Well Control Occurrences

Collection of key well-control occurrence data by the EUB helps monitor industry performance and identifies the need for changes to regulations, inspection procedures, or operating practices. One of the primary indicators of industry's drilling and servicing performance is the number of well-control occurrences recorded and industry's response to these incidents.

Of the 7094 wells drilled in 1998/99, nine blowouts¹ were recorded. Five were freshwater flows that occurred while drilling surface holes — i.e., there were no surface pipe or blowout preventers in place. The remaining four blowouts occurred at depths shallower than 350 m, resulting in sweet gas releases with no significant environmental impact.

One sour gas well blow² of short duration occurred during drilling and the well was successfully shut in with existing blowout prevention equipment. As a precaution, hunters were evacuated from the area until the situation was brought under control.

Table 3. Drilling and servicing well control occurrences, 1998/99

	Drilling	Servicing
Blowouts	9	1
Blows	1	
Kicks	101	N/A

During 1997/98 the kick³ occurrence rate dropped significantly to 12 kicks per 1000 wells drilled from the previous four-year average of 23. In 1998/99 the rate remained very low, at 14, indicating the drilling industry's commitment to high-quality equipment and personnel training.

EUB Action

- A review is in progress to identify measures that can be taken to reduce occurrences of shallow gas and freshwater blowouts.

¹ The complete loss of control of the flow of fluids (gas, oil, water, mud) from a well. Control can only be regained by installing or replacing equipment to permit shut-in or killing the well or by drilling a relief well.

² The unexpected release of wellbore fluids (gas, oil, water, mud) to the atmosphere. The flow can be controlled almost immediately by shutting the well in using wellhead valves or blowout prevention equipment or by directing the flow to the flare system until the well is filled.

³ Any unexpected entry of water, gas, oil, or other formation fluid into a wellbore that is under control and can be circulated out.

- As always, the EUB expects industry to maintain its high training standards for rig personnel in well control, and crew training continues to be a high-priority inspection area for the EUB.

2.3 Drilling — Inventory, Activity Levels, and Inspections

The 7094 new wells drilled in the province during 1998/99 are significantly fewer than the 1997/98 record of 13 075 wells. The 1998/99 addition of new wells drilled brings the total number of nonabandoned wells in Alberta to over 129 000.

During the 1998/99 reporting period, EUB field inspectors conducted 696 inspections of drilling operations, resulting in 105 unsatisfactory inspections. This compares to 421 inspections, with 89 unsatisfactory inspections, in 1997/98. The number of unsatisfactory inspections decreased by 6 per cent in 1998/99 to 15 per cent — a significant improvement over 1997/98, when the unsatisfactory inspections totalled 21 per cent.

Table 4. Alberta drilling activity and EUB inspection results

	1994	1995	1996	1997/98	1998/99
	9484	8907	10 773	13 075	7094
Wells drilled					
Drilling rigs inspected	649	393	458	421	696
% inspected	7	4.4	4.2	3.2	9.8
% unsatisfactory (total serious and significant)	18	13	12	21	15

EUB Action

- Continued use of a priority inspection system (OSI) that targets previous offenders and high-risk facilities should result in further reductions in the overall unsatisfactory inspection rate.
- Applying consistent enforcement action for noncompliance will increase industry awareness of EUB requirements. Ensuring that industry meets drilling requirements continues to be a priority.

2.4 Serious Deficiencies

A serious deficiency is a contravention of EUB regulations that could

- restrict a rig crew's ability to safely detect and circulate out a kick or shut in a well,
- contribute to an operational failure of the blowout prevention (BOP) equipment, or
- impair a rig crew's ability to maintain control of a well.

Of the 696 drilling inspections conducted in 1998/99, field staff identified 50 serious unsatisfactory inspections and recorded 64 serious deficiencies. Operational failures of the BOP/accumulator systems resulted in 43 of those deficiencies, while deficiencies in crew training accounted for the remaining 21 (see Figure 6).

The EUB conducted 392 inspections—compared to 167 in 1997/98—on well servicing operations, resulting in 48 unsatisfactory inspections, up from 23 unsatisfactory in 1997/98. Of the 48 unsatisfactory inspections, 19 were serious deficiencies, compared to 10 in 1997/98. Operational failures of the BOP/accumulator systems accounted for all 19 of the serious deficiencies (see Figure 7).

EUB Action

- Drilling operations were suspended at all rigs with serious deficiencies until they were corrected. This resulted in 50 shutdowns for approximately 57 hours, a significant decrease from last year when shutdown costs were estimated at 150 hours. (See Table 2 for a summary of shutdowns.)

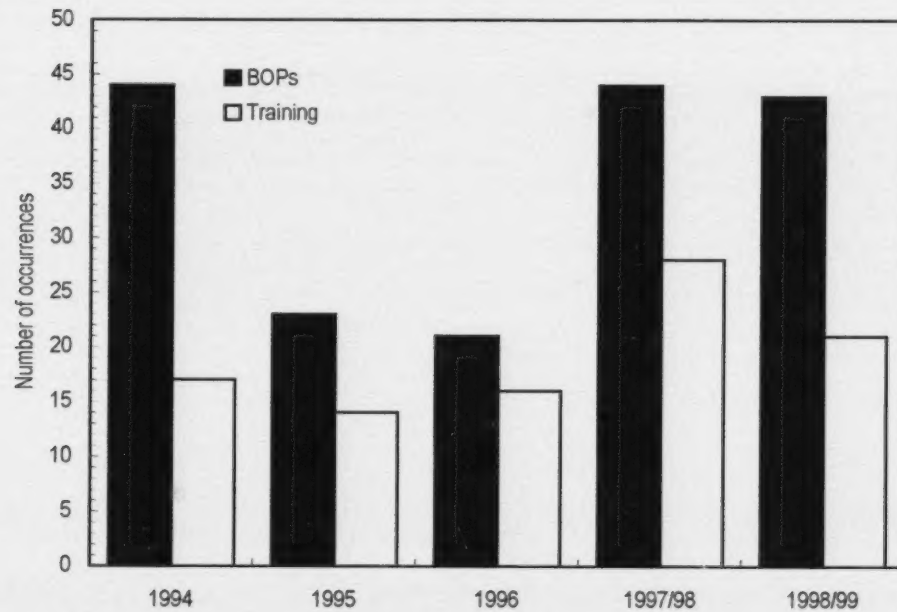


Figure 6. Serious deficiencies on drilling rigs

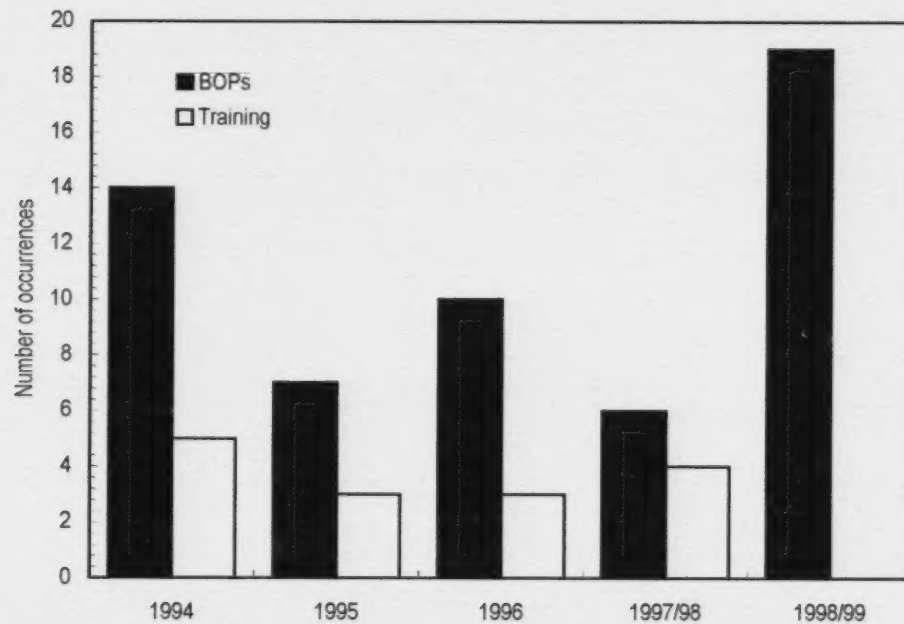


Figure 7. Serious deficiencies on service rigs

- Servicing operations were suspended at all well sites having serious deficiencies, resulting in 19 rig shutdowns totalling approximately 28 hours.
- The EUB will continue to take enforcement action for all unsatisfactory inspections, including suspension of operations with serious deficiencies.

2.5 Flowing Wells to Rig Tanks and Venting Gas to Atmosphere

A number of serious explosions and fires have occurred at service rig sites in Alberta since late 1997. Six workers were injured and significant property damage occurred. Investigations into these incidents showed that service rig companies and the operators who hire them are not adequately identifying and controlling hazardous atmospheres involving hydrocarbons.

EUB Action

- All well operators and/or service companies engaged in the practice of bleeding off pressure or flowing a well directly to a rig or open storage tank are cautioned to assess the risks and hazards associated with the procedure.
- *Alberta Recommended Practices (ARP), Volume 4, Well Testing and Fluid Handling, Section 4.2, Well Testing, and Section 4.3, Other Flowbacks*, outlines proper procedures for venting or flowing wells to tanks. This ARP is being updated by the Well Testing Committee of the Petroleum Services Association of Canada under the direction of the Drilling and Completions Committee. The committee will review the current practice and provide additional recommendations to industry.

2.6 General EUB Action for Drilling and Servicing

2.6.1 Inspection Manual Reviews

In July 1997, the EUB undertook to review and rewrite *Guide 36: Drilling Rig Inspection Manual*. The primary focus was to clarify sections of the manual and make it more user friendly. The Coiled Tubing Unit (CTU) subcommittee of the Drilling and Completions Committee (DACC) presented a draft inspection manual to DACC and the EUB for comment last year.

A revised draft of the manual is expected to be available in spring 2000 for stakeholder review by the Canadian Association of Oilwell Drilling Contractors, the Canadian Association of Petroleum Producers, and the Small Explorers and Producers Association of Canada. The manual may be released as a stand-alone document or may be incorporated into existing EUB drilling and servicing manuals.

Certification standards are also being considered by the CTU for coiled tubing operators.

2.6.2 General Bulletin 98-28: Well Stripping Operations

General Bulletin 98-28 outlines EUB policy for using blowout preventers (BOPs) to strip tubulars and/or tools during servicing or drilling operations at well sites. In discussions with several operators and contractors, the EUB learned that tubulars and other tools were being stripped through the BOPs, which is an unacceptable practice.

The EUB is clear that well control is the first priority and operations that jeopardize the integrity and capability of the BOPs to control well flow will not be tolerated. This policy will be incorporated into a revised drilling and servicing rig inspection manual.

2.6.3 General Bulletin 98-33: Well Control Certification

General Bulletin 98-33 advised that Oil and Gas Conservation Regulation, Section 8.142(1)(c), respecting well control certification was repealed in November 1998. The following was substituted:

- (c) A Licensee Wellsite Representative and a Rig Manager (Tool Push) possess a "Second Line Supervisor's" certificate in well control procedures, issued within the previous two years by the Petroleum Industry Training Service and that a Licensee Wellsite Representative or a Rig Manager (Tool Push), is readily available at all times.

This change was recommended by the industry-government Well Control Certification Committee to align Alberta's well control certification requirements with other Canadian jurisdictions. *EUB Guide 36: Drilling Rig Inspection Manual* will be revised with the change.

Section 3 Oil Production Facilities

3.1 Reduction in Potential Public Liabilities from Suspended and Derelict Facilities

In 1998/99 EUB field staff focused their efforts on facilities that have not produced for two or more years. They identified 298 facilities and requested companies to abandon them if they were uneconomical, remove production equipment, and complete facility rehabilitation where necessary. Expenditures by industry on these suspended and derelict facilities was estimated to be \$4.5 million.

The EUB does not record the number of facilities that companies cleaned up on their own as a result of realizing the importance of reducing their environmental liabilities. However, the EUB believes industry efforts have been significant. For example, some companies proactively evaluate their nonproducing properties and when found to be uneconomical, they abandon them and reclaim the lease. The market for used wellhead equipment and casing and production equipment offsets the cost of well abandonment and reclamation.

EUB Action

- The EUB will continue to focus on nonproducing facilities and associated pipelines and to request companies to take action to reduce potential for public liability.

3.2 Companies with Poorest Oil Production Inspection Records

As per *EUB Guide 45: Battery Inspection Manual*, the EUB considers any company with three or more major unsatisfactory inspections provincially to have a poor inspection record. In 1997, 15 companies were identified. Each company was contacted, a review of its 1997 inspection records was discussed, and the company was requested to develop an action plan for preventing the recurrence of major unsatisfactory conditions at its facilities.

There was a significant improvement in the inspection records of these 15 companies in 1998/99. As shown in Figure 8, major unsatisfactoriness were reduced from 10.9 per cent in 1997/98 to 2.0 per cent in 1998/99—below the 1998/99 industry average of 2.6 per cent.

As a follow-up to the 1996 statistics, the major unsatisfactory inspections for the eight companies identified in that year dropped from 18.0 per cent in 1996 to 5.1 per cent in 1997/98 and 2.2 per cent in 1998/99.

EUB Action

- The EUB will continue to monitor the inspection records of these companies to ensure continued compliance.

3.3 Public Complaints

For the 1998/99 fiscal year, EUB Field Centres investigated 92 public complaints related to odours and smoke/flaring at oil production facilities, compared to 110 similar complaints the previous year (see Figure 9).⁴

⁴ This section reports on public complaints for oil production facilities only. For an overview of public complaints from all types of petroleum facilities, see Section 1.4.

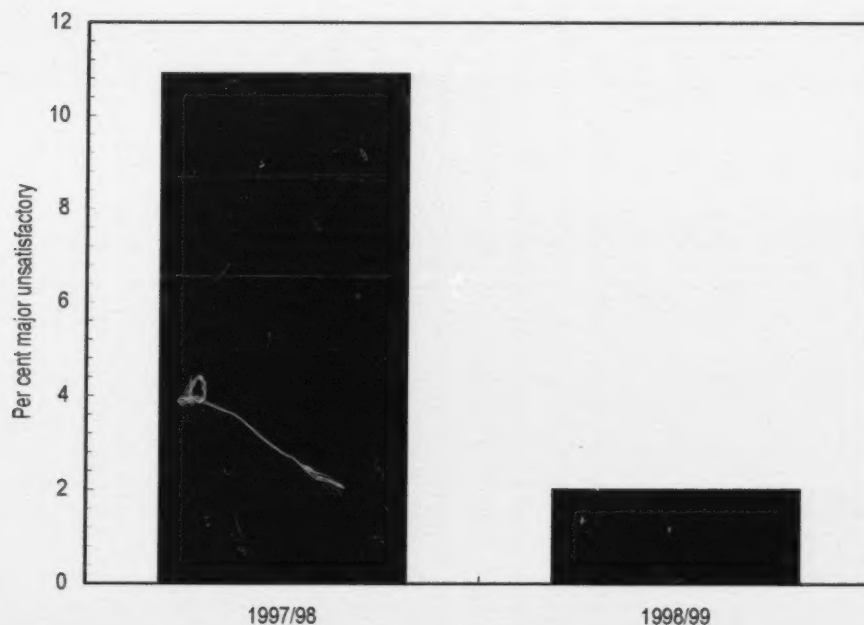


Figure 8. Percentage of major unsatisfactory inspections for 15 target companies

Each year the EUB also reviews the public complaint history of each oil production facility to determine if there were repeat complaints. If so, EUB staff conduct a review to determine if additional regulatory or industry action was required to effectively achieve lasting improvement.

In the 1998/99 reporting year, 31 oil facilities were identified with repeat public complaints. These public complaints were related to odours, smoke/flaring, noise, spills, and lease management. A review of repeat complaints did not identify any facilities requiring additional follow-up because all of the issues were resolved. In the previous year, 12 facilities with repeat complaints were identified that required further follow-up. None of these 12 facilities had repeat complaints in 1998/99.

EUB Action

- Industry must be diligent in their operations to minimize their impact on the public. The EUB expects operators to investigate sources of emissions and to install new equipment using new technologies to reduce emissions and to keep area residents informed of operational problems that may impact them.
- The EUB must be firm, fair, and consistent when investigating and applying consequences for noncompliance. With the development and implementation in mid-1999 of enforcement ladders, expectations and escalating consequences will be clearly defined for inspections with noncompliant results.
- The EUB expects industry to reduce the number of repeat complaints by immediately addressing problems and preventing similar occurrences at their facilities throughout the province.

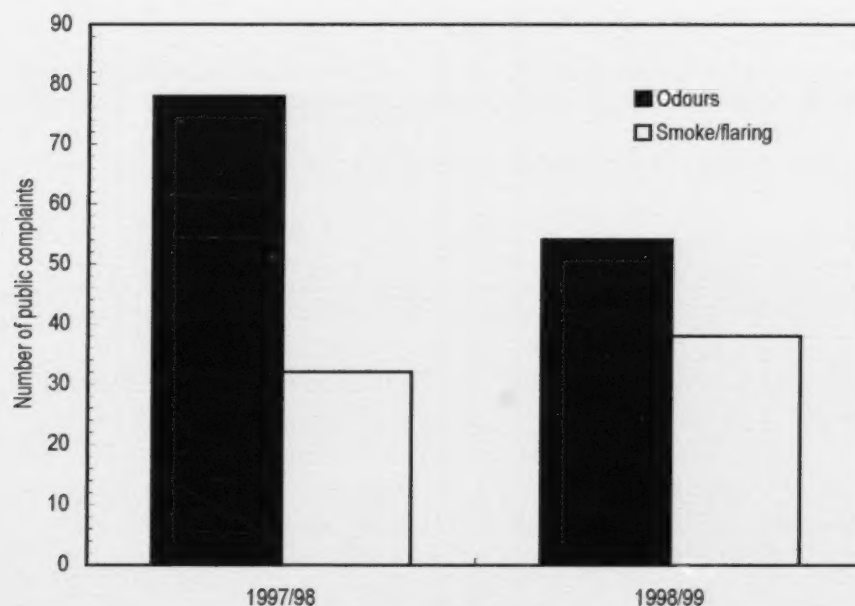


Figure 9. Oil production — odour and smoke/flaring complaints

3.4 Inventory, Activity Level, and Inspections

The current inventory of conventional oil and crude bitumen batteries/satellites is as follows:

- sweet multiwell 1492
- sour multiwell 591
- sweet single well 8043
- sour single well 1245
- sweet satellites 2121
- sour satellites 1295

Figure 10 shows the inventory of oil batteries, the number of battery inspections, and the percentage found to be unsatisfactory from 1989 to 1998/99. Figure 11 shows the percentage of oil facility inspections that found major unsatisfactory items over the five-year period of 1994 to 1998/99.

Using the OSI⁵ priority inspection process, EUB staff conducted 5130 oil battery and satellite inspections (including 1400 reinspections) in 1998/99. The increase in the number of oil facility inspections can be partially attributed to the EUB's focus on suspended facilities that have not produced for two or more years and facilities that have not been inspected in the past five years.

⁵ The EUB does inspections based on priority selection criteria that include **operator**/contractor performance history, site **sensitivity**, and **inherent** risk of the operation (OSI).

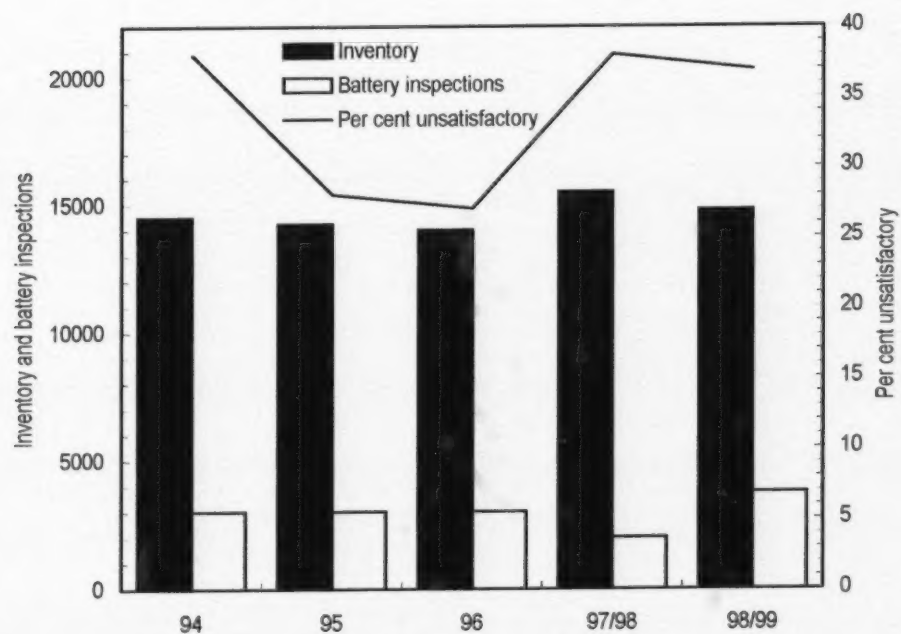


Figure 10. Inventory battery inspections and per cent unsatisfactory

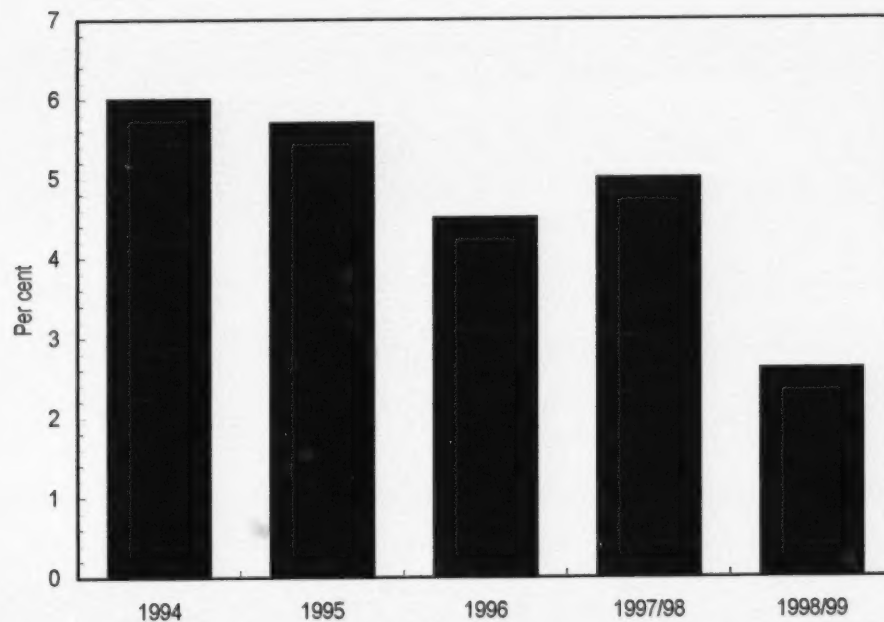


Figure 11. Oil facility inspections with major unsatisfactory items

Major unsatisfactory conditions were found in 137 of 5130 inspections (2.7 per cent) in 1998/99, compared with 146 major unsatisfactory items identified in 2883 inspections (5.1 per cent) in 1997/98. Major unsatisfactory items include:

- H₂S emissions;
- repetitive spills or existing spills that are not being cleaned up;
- production tanks with no dikes;
- poorly constructed or maintained flare pits that constitute a hazard to groundwater; and
- failure to adhere to Board orders and approvals.

Figure 12 shows the most common oil facility major unsatisfactory items found in 1998/99, while Figure 13 shows the most common minor unsatisfactory items found.

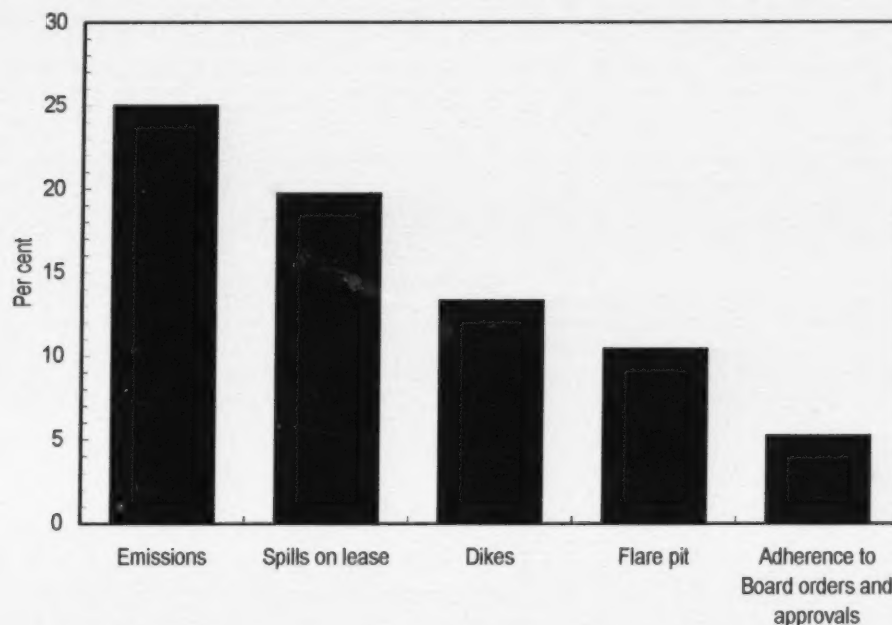


Figure 12. Oil facilities' most common major unsatisfactory items, 1998/99

EUB Action

- EUB staff are enforcing major unsatisfactory items much more strictly and operators must understand the need to immediately identify and address any major unsatisfactory condition at their facilities.
- EUB field staff base their inspection work on two inspection manuals, *Guide 45: Battery Inspection Manual* and *Guide 54: Gas Inspection Manual*. These manuals will be combined and revised to reflect changes in inspection criteria and enforcement actions to be taken for minor, major, and serious noncompliance issues.

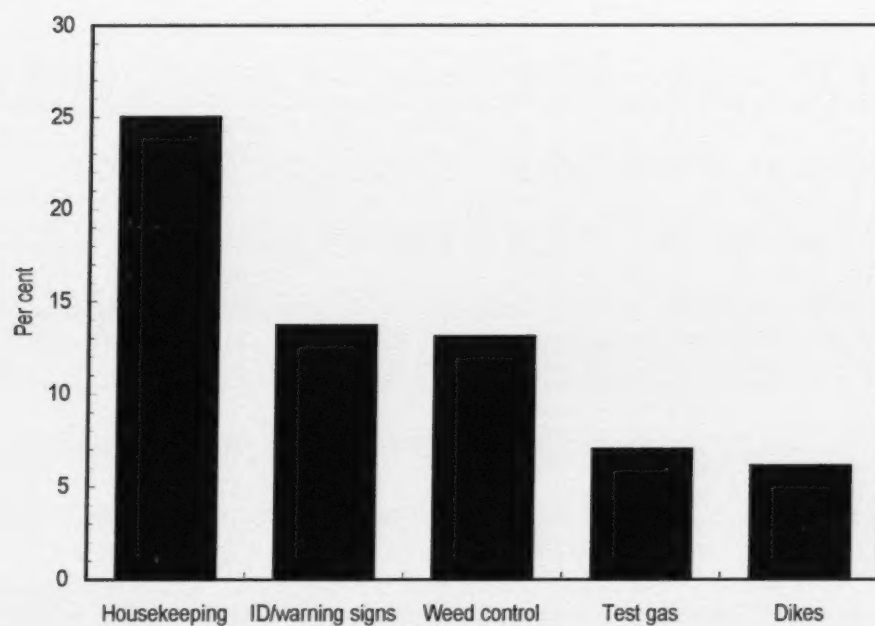


Figure 13. Oil facilities' most common minor unsatisfactory items, 1998/99

Section 4 Flaring

4.1 Solution Gas Flaring

Solution gas conservation is no longer based solely on economics, but consideration must also be given to the impact of flaring on the public and the environment. In 1998/99 EUB staff worked to reduce solution gas flaring by encouraging industry to

- tie in flaring facilities to gas conserving facilities;
- reduce flaring during well testing operations by in-line testing and temporary tie-ins;
- reduce flaring at oil facilities when gas conserving facilities are down for scheduled or unscheduled maintenance; and
- shut in new oil well production after well test completion until gas conserving facilities are constructed.

During the year, the EUB noted a number of innovative methods being used by industry to reduce solution gas flaring. These included

- downhole injection of solution gas when it is uneconomical to conserve the gas;
- considering gas conservation and pipelines as part of early planning during the well licence application stage;
- looping pipelines to alternative gas conserving facilities for planned or emergency shutdowns; and
- scheduling maintenance and repairs with gas plant turnarounds when and where it is safe to do so.

The following summarizes EUB and industry efforts to reduce solution gas flaring in 1998/99 (also see Figure 14):

- seventy-nine nonconserving solution gas batteries were tied in to conserving batteries, resulting in a reduction of 704 E³m³/day in flared volumes, and
- solution gas flaring during plant turnarounds was reduced by 12 475 E³m³.

Table 5 presents a comparison of total solution gas production and total flared volume in 1997 and 1998, showing that there was a 12.4 per cent reduction in the volume flared in the one-year period.

EUB Action

- The EUB is currently assessing facilities on a prioritized, site-specific basis to determine if flaring reductions are warranted. If so, industry is encouraged to take action.
- In 1998/99 the EUB focused its efforts on batteries flaring more than 80 E³m³ per month and flaring during turnarounds.

Table 5. Total solution gas production and total flared volume

	1997	1998	Reduction
Total solution gas production	22 642 000 E ³ m ³	22 919 000 E ³ m ³	
f Total flared volume	1 470 000 E ³ m ³	1 287 720 E ³ m ³	12.4%

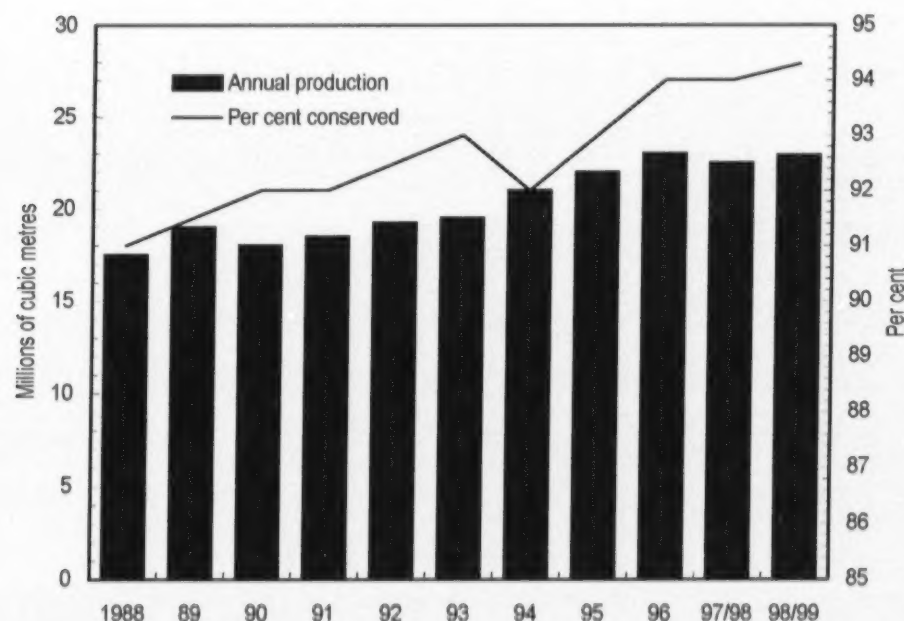


Figure 14. Total solution gas production and per cent conserved from conventional oil batteries

4.2 Upcoming EUB Action for Reducing Solution Gas Flaring

4.2.1 Flaring Reduction Schedule

A multistakeholder examination of the recommendations made by the Clean Air Strategic Alliance (CASA) resulted in the development of a provincial schedule for reducing solution gas flaring. Using 1996 solution gas flare volumes from conventional and crude bitumen batteries as the baseline, the provincial targets are

- a 15 per cent reduction from the 1996 baseline by end of year 2000 ($1445 \text{ E}^6 \text{m}^3$), and
- a 25 per cent reduction from the 1996 baseline by end of year 2001 ($1275 \text{ E}^6 \text{m}^3$).

To meet or exceed reduction targets, industry must meet the following requirements:

- evaluate all existing solution gas flares for conservation within three years using a flaring management decision tree, including a streamlined common economic assessment process, and
- address nonroutine flaring at conserving batteries.

4.2.2 Nonroutine Flaring Requirements

Nonroutine solution gas flaring is any planned or emergency event that results in additional flaring beyond the normal flare volumes at a gas conserving battery. Nonroutine flaring may happen during upsets, maintenance, and repairs at a battery or the downstream pipelines and solution gas plant. Nonroutine solution gas flaring at conserving batteries falls under three categories, as outlined in Table 6. Operational

requirements for each shutdown category are defined as a function of flaring incident duration. These requirements will be effective 1 January 2000.

Table 6. Future operational requirements for conserving facility flaring

Shutdown category	Duration (hours)	Operational requirements
Planned	<4	Operators will make all reasonable efforts to reduce battery inlet gas volumes by 50 per cent of average daily production over the previous 30 days.
	>4	Operators will make all reasonable efforts to reduce battery inlet gas volumes by 75 per cent of average daily production over the previous 30 days with the following conditions: • Production rates will be sufficient to keep equipment operating safely and within minimum design turndown range. • Public, including residents within 500 m, interested individuals, and people sensitive to emissions at the battery, must be notified at least 24 hours before the planned flaring event. • The appropriate EUB Field Centre must be notified prior to the planned shutdown, including about any unresolved public complaints. • The appropriate EUB Field Centre must be notified if the event meets reporting requirements identified in <i>IL 98-01</i>, Section 4.4.
Emergency or plant upset ¹	<4	No reduction in battery inlet is required.
	>4	Operators will make all reasonable efforts to reduce battery inlet gas volumes by 75 per cent of average daily production over the previous 30 days with the following conditions: • Production rates will be sufficient to keep equipment operating safely and within minimum design turndown range. • Public, including residents within 500 m, interested individuals, and people sensitive to emissions at the battery, must be notified as soon as practical during the flaring event. • The appropriate EUB Field Centre must be notified within 10 days of the flaring event of any unresolved public complaints. • The appropriate EUB Field Centre must be notified if the event meets reporting requirements identified in <i>IL 98-01</i>, Section 4.4.
Repeat nonroutine flaring ²		Operators must investigate causes of repeat nonroutine flaring and take steps necessary to eliminate or reduce the frequency of such incidents. Operators must notify the EUB of unresolved public complaints regarding repeat flaring within 10 days of the complaint.

¹Emergency shutdowns or plant upsets are unplanned events at a battery site or at facilities downstream of a battery that result in nonroutine flaring at the battery.

²Repeat nonroutine flaring is defined as recurring events of similar cause at a conserving battery during a 30-day period.

Section 5 Gas Production

5.1 Introduction

The EUB, often in conjunction with Alberta Environment (AENV), completes facility audits of gas plants. The EUB's gas plant operational audit team focuses on environmental and public safety issues, verifying industry's understanding of and compliance with regulatory requirements and public expectations. Forty operational audits of sulphur recovery facilities have been completed since 1996, including 18 in 1998/99. Of the 40 audits completed, 4 facilities had major unsatisfactory inspections, including 2 in 1998/99.

In 1997/98 a total of 21 action plans were requested from companies with gas processing facilities exceeding the 0.5 per cent yearly flaring allowable. A review of flaring reports in 1998/99 indicated that 17 of the 21 facilities had reduced their reported flared volumes from the previous year. Operational upsets, flaring overhead gas, and production accounting errors were the most common problems associated with excessive plant flaring. Through EUB efforts and industry's increased awareness of their flaring practices, 16 402 10³ m³ of gas was conserved as a result of reduced flaring at these facilities.

EUB staff spend considerable time attempting to resolve public and industry disputes concerning proposed gas production facilities. Staff involvement in open houses, information sessions, and individual and community meetings helps alleviate public concerns with proposed facilities and improves industry's awareness of their facilities' impact on surrounding residents.

The EUB strongly believes its strategy of focusing inspection efforts on high-risk facilities in populated and sensitive areas has contributed to a reduction in public complaints since 1994.

5.2 Inventory, Activity Level, and Inspections

Continued record activity levels in the natural gas industry resulted in an increase of 3435 new producing gas wells in 1998/99. At year-end, there were 45 015 producing gas wells in Alberta.

Gas plant inventory has remained relatively constant over the last five years, as shown in Figure 15. Currently, 413 sweet gas plants and 231 sour gas plants are operating in the province, including 52 sulphur recovery facilities and 8 straddle plants.

The number of gas batteries has continued to increase significantly since 1994. The majority of new gas production in 1998/99 was tied into existing pipelines and processing facilities.

Field staff completed 643 initial inspections of gas processing plants and gas batteries in 1998/99. This represents a significant increase in inspection levels when compared to previous years, as reflected in Figure 16.

EUB Action

- The EUB will continue to increase its gas facility inspection level as necessary to achieve continued improvement in compliance levels.

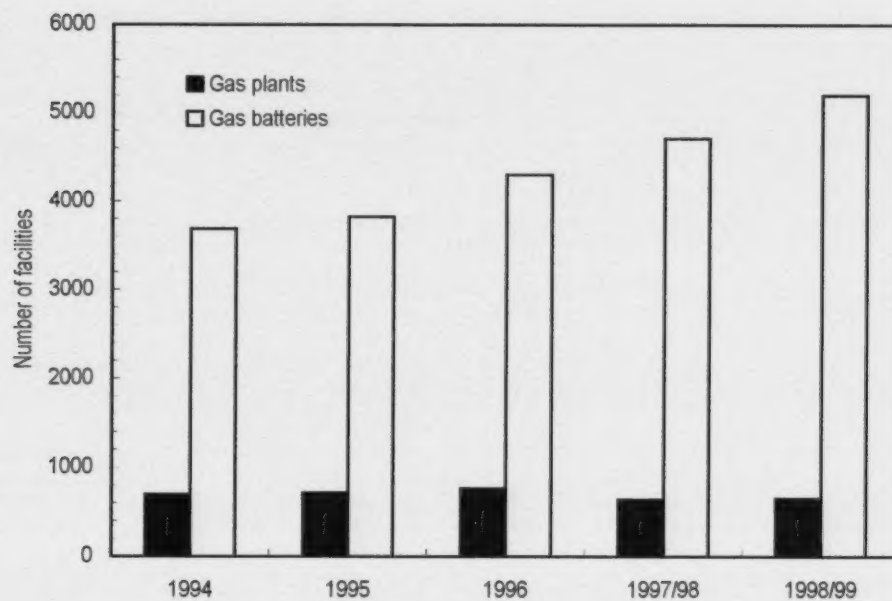


Figure 15. Gas facilities inventory

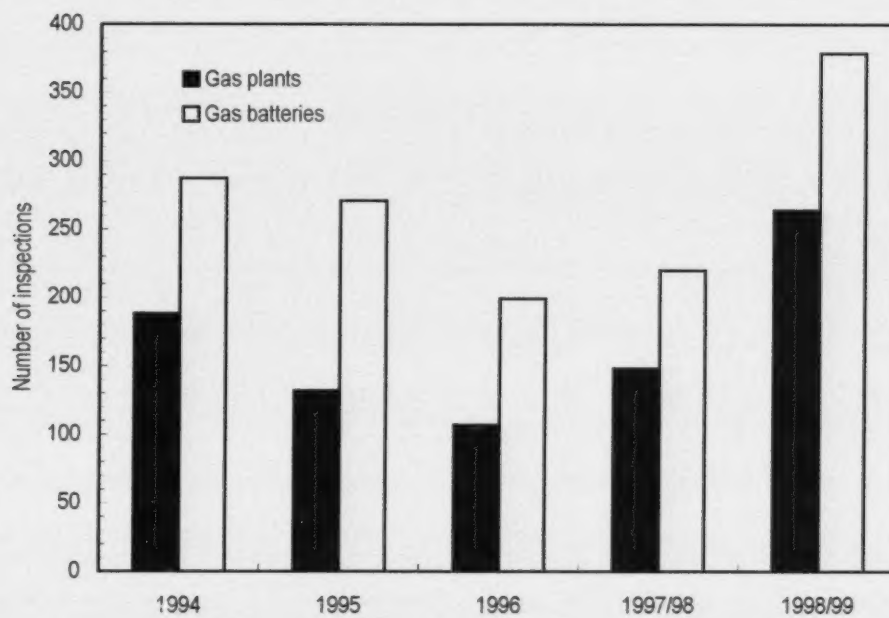


Figure 16. Gas production — inspections

5.3 Problem Areas and Response

Unsatisfactory inspection rates at gas production facilities in 1998/99 increased slightly from 1997/98 (see Figure 17). This is likely the result of focusing inspection activities on companies with poor inspection and complaint histories. The percentage of satisfactory follow-up inspections decreased slightly during the current reporting year; however, it remains high, as reflected in Figure 18.

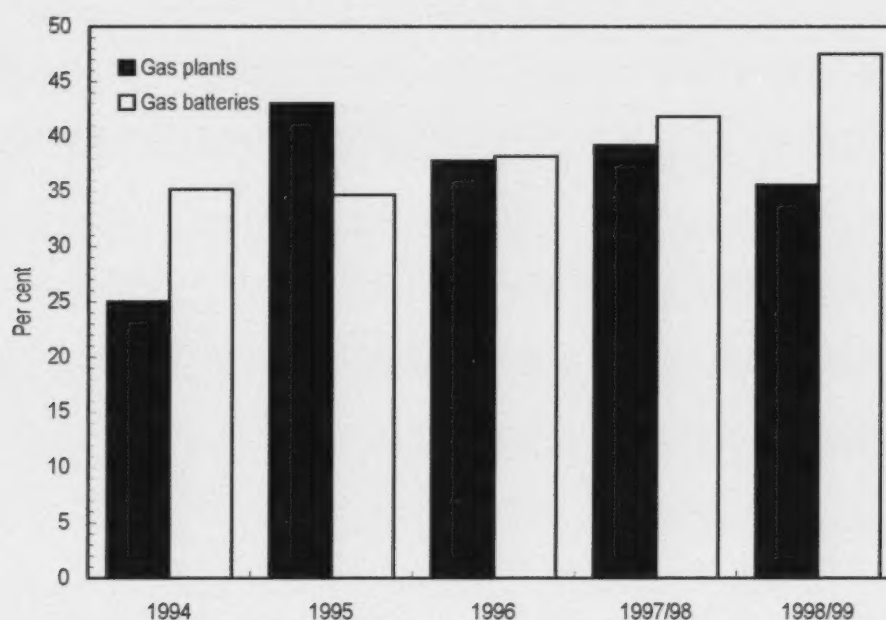


Figure 17. Gas production — unsatisfactory initial inspections

The total number of public complaints relating to gas production facilities remained virtually unchanged from the previous two years, as seen in Figure 19. Noise from natural gas compressors, fugitive H_2S odours, sulphur emissions from sour gas facilities, and flaring/black smoke continued to be the primary issues that negatively affect the public, as shown in Figure 20.

Sulphur recovery efficiencies at plants recovering salable sulphur remained unchanged from 1997/98 at 98.7 per cent, as reflected in Figure 21. Sulphur production increased approximately 3 per cent, resulting in a 2 per cent increase in sulphur emissions in 1998/99 from emissions in the previous year due to the increase in total plant throughput.

Unsatisfactory inspection items are classified as either major or minor deficiencies for the purpose of judging the severity of deficiencies and determining appropriate enforcement actions. Major unsatisfactory inspections having the potential to cause an adverse impact on the public or the environment accounted for 3.9 per cent of all inspections completed during the year.

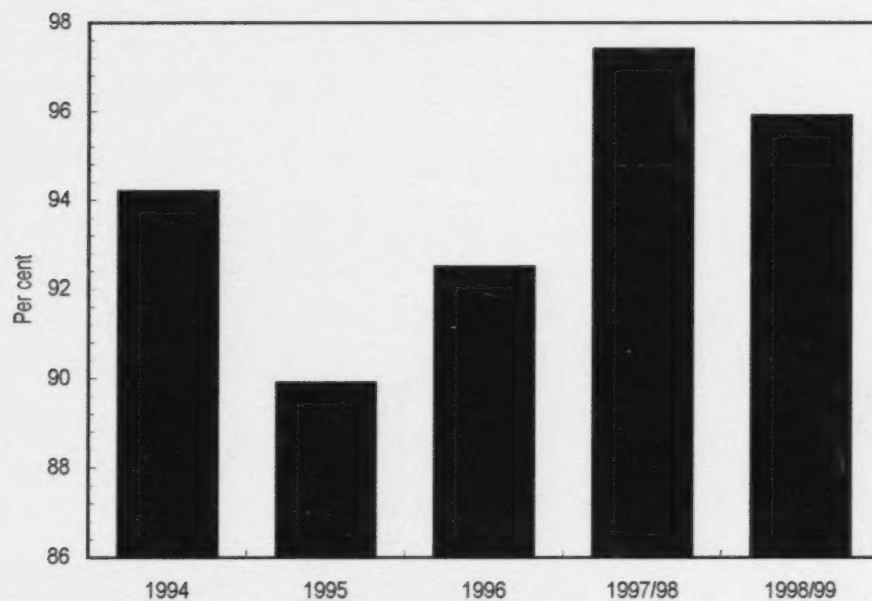


Figure 18. Gas production — satisfactory follow-up inspections

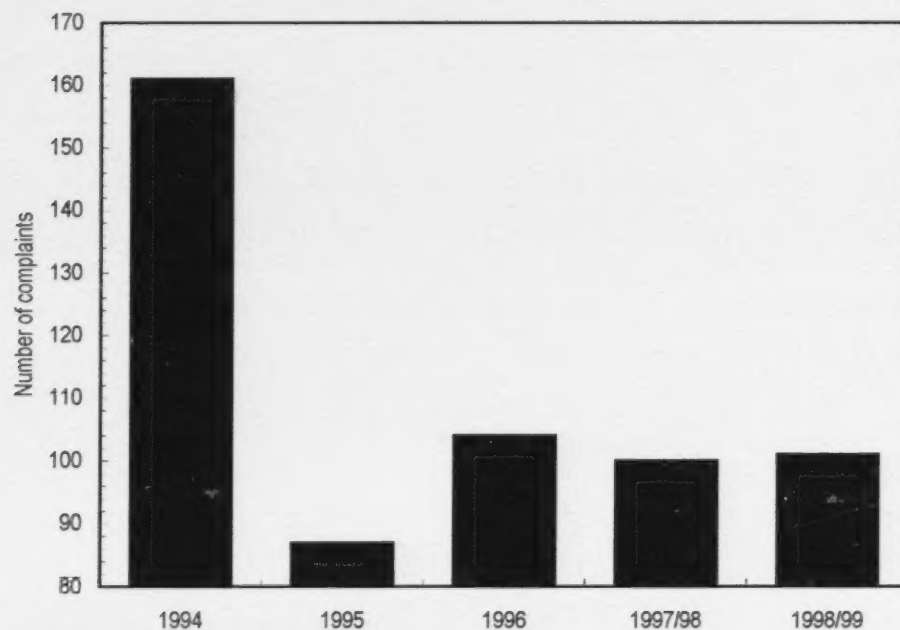


Figure 19. Gas production — total complaints

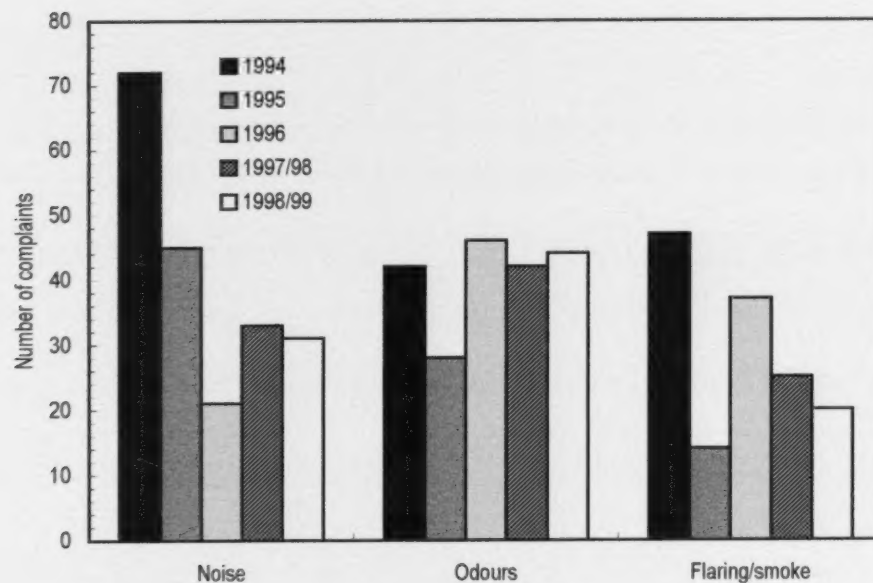


Figure 20. Gas production — nature of complaints

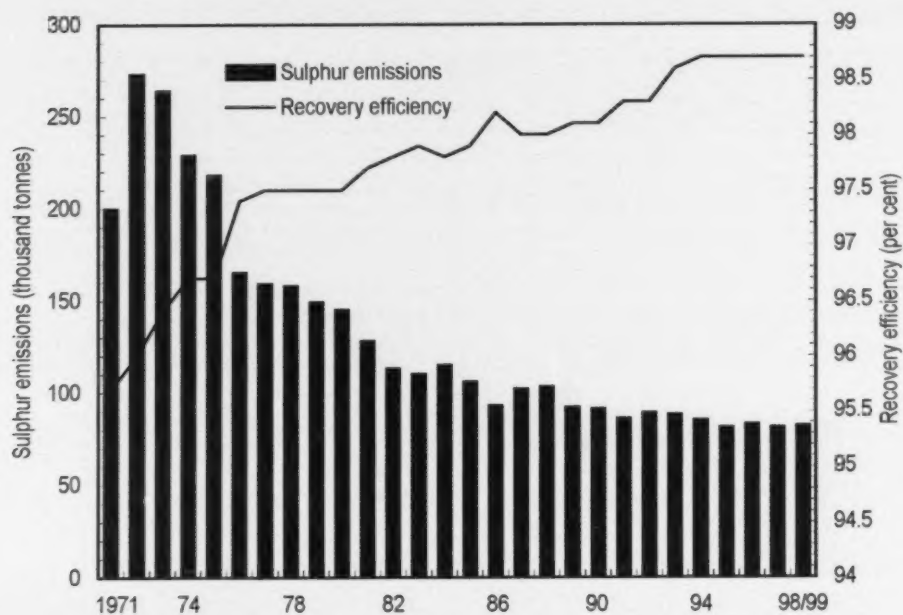


Figure 21. Efficiency versus emissions of sulphur recovery plants

Unaddressed hydrocarbon spills and severe sour gas emissions were the most common major deficiencies at gas production facilities, as shown in Figure 22. Poor housekeeping practices (e.g., hydrocarbon staining), overdue gas well meter calibration, improper or no lease identification signs, and insufficient tank dikes accounted for 55 per cent of all minor deficiencies recorded during the year.

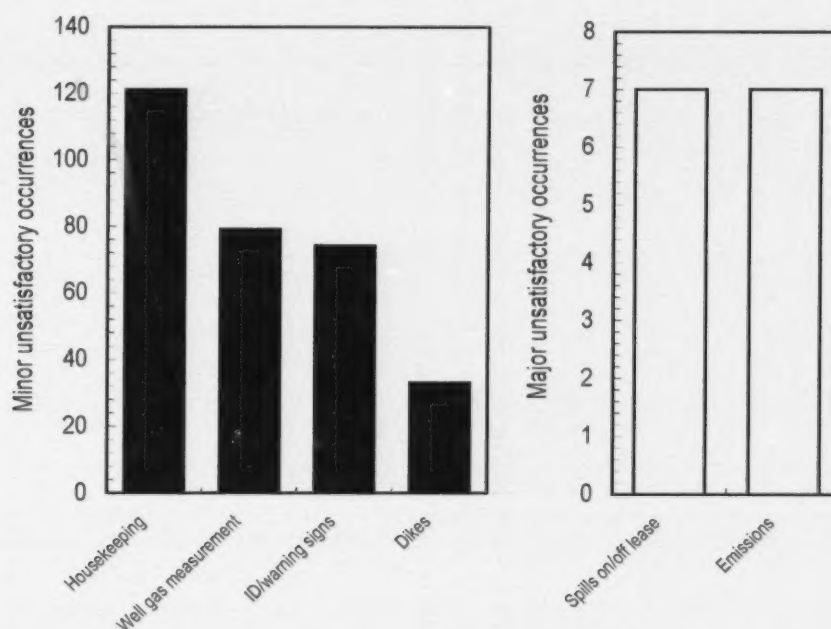


Figure 22. Gas production — most common major/minor unsatisfactory occurrences, 1998/99

EUB Action

To improve industry compliance levels and minimize the impact of gas production facilities on the public and the environment, the EUB has implemented the following key strategies:

- A new priority inspection selection process focusing on companies with poor inspection records and facilities having the greatest potential to impact the public or environment was developed in 1998/99. The process was implemented for gas production surveillance in April 1999. Inspections are prioritized based on operator status, site sensitivity, and inherent risk (OSI).
- In 1996 an inspection program was developed that integrates a general plant inspection with a more detailed assessment of environmental and related public issues. Emergency response preparedness, flare measurement and control, waste management practices, equipment integrity, and corrosion monitoring and inhibition are just some of the items reviewed through the audit process. This integrated approach will continue in the future.
- Gas production facilities significantly affecting the public or environment are suspended until improvements are completed, ensuring the facility operates with

minimal impact. EUB staff suspended nine facilities in 1998/99. Severe H₂S emissions and noise from compressors were the most common reasons for the suspensions.

- A gas plant flaring surveillance program was initiated in 1998 to encourage industry to reduce flaring at gas processing facilities. As part of an ongoing process to assist with reducing flaring, companies with gas plants flaring more than 0.5 per cent of the total annual volume delivered to the plant were required to submit a plan outlining actions for reducing flared volumes.

Section 6 Pipeline

6.1 Introduction

As of 1998/99, there are about 264 000 kilometres of pipeline under EUB jurisdiction (see Figure 23). On an ongoing basis, EUB pipeline inspections focus on improved public safety, reduced environmental impacts, and reduced public liabilities. For 1998/99, the EUB Pipeline Planning Team identified the following four goals:

- 1) Reduce pipeline failures — Minimize environmental impacts and public risk by identifying causes of corrosion and ensuring that mitigation and early leak detection techniques are used on the pipeline system after any failure.
- 2) Operations inspections — Conduct inspections on licensed systems to ensure that operators meet records and maintenance requirements for continuous pipeline integrity. Review operational status of systems for suspended or discontinued lines to reduce potential liabilities. Perform right-of-way and signage inspections to reduce public and environmental risks.
- 3) Pipeline hits — Hold awareness seminars for operators and contractors to reduce incidents of pipeline hits, enhance public safety, and reduce environmental impacts.
- 4) Construction and testing inspections — Inspect new line construction for compliance with appropriate codes, acts, and regulations, ensuring that failures, public safety hazards, and environmental concerns will not occur.

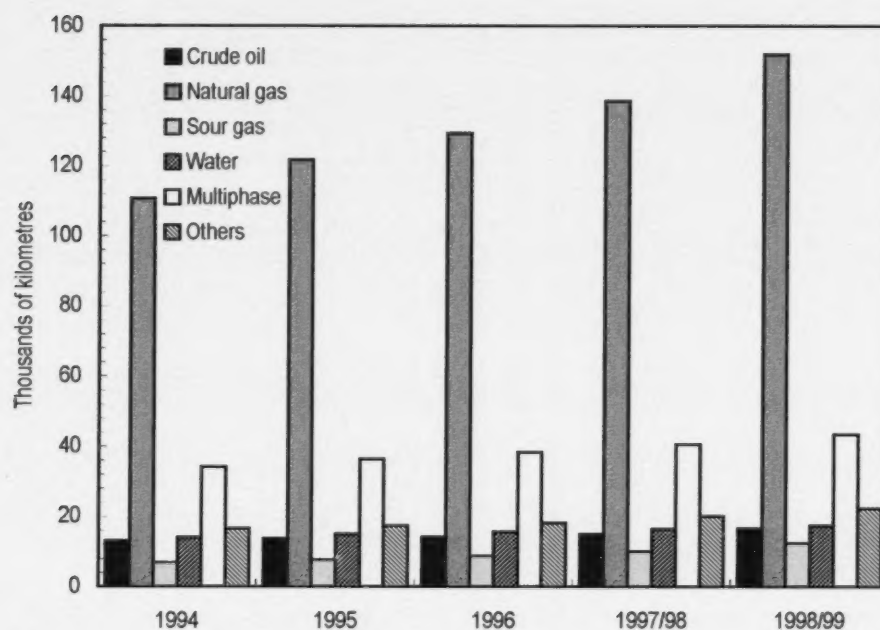


Figure 23. Cumulative pipeline lengths

6.2 Pipeline Construction and Testing

Provincially there were 358 pipeline inspections conducted during construction to test compliance with applicable codes and regulations. There were 99 deficiencies, of which 8 required the immediate shutdown of operations. Enforcement action was taken for all deficiencies ranging from warnings to suspensions, depending on severity.

Unsatisfactory items found during EUB inspections included:

- no approvals;
- approval information not correct (e.g., pipe size, wall thickness, grades, and alignment to and from locations);
- no crossing agreements in place;
- pipe and valve rating not suitable for approval pressures;
- unacceptable general construction practices (e.g., stringing, welding, trenching; backfilling, road and creek crossing);
- improper exposing techniques used at foreign crossings; and
- testing requirements not met.

EUB Action

- The EUB will continue to ensure that industry is aware of regulatory requirements and the consequences of not meeting these.

6.3 Pipeline Failures

Table 7 and Figures 24 and 25 summarize information from the EUB pipeline failure database.

Table 7. Failures by cause, 1998/99

Corrosion ¹	572	64.6%
Other failure	313	35.4% (external forces, joints, welds, equipment, and others)
Total	885	

¹ Salt water, multiphase, and natural gas lines make up 93 per cent of all corrosion failures.

EUB staff inspected 400 pipeline failures to determine the causes in 1998/99. As a result, industry was required to do associated work to establish line integrity following a failure at an estimated cost of over \$1.8 million provincially. Work included

- requalification testing (total of 581, with 38 failing during requalification)
- failure mechanism reports (400 requested to establish mechanism of failure)
- licence amendments (158 amendments to replace or internally line the pipe with a new corrosion barrier or to abandon)
- other (146)
 - upgrading system mapping of pipelines, identifying outside diameter and product velocities
 - analysis of product shipped
 - analysis of product received
 - injection of corrosion inhibitors
 - filtration system installation to remove solids
 - internal smart pig inspections
 - cathodic protection surveys
 - installation of pigging facilities
 - risk assessments (i.e., pipeline and environmental)

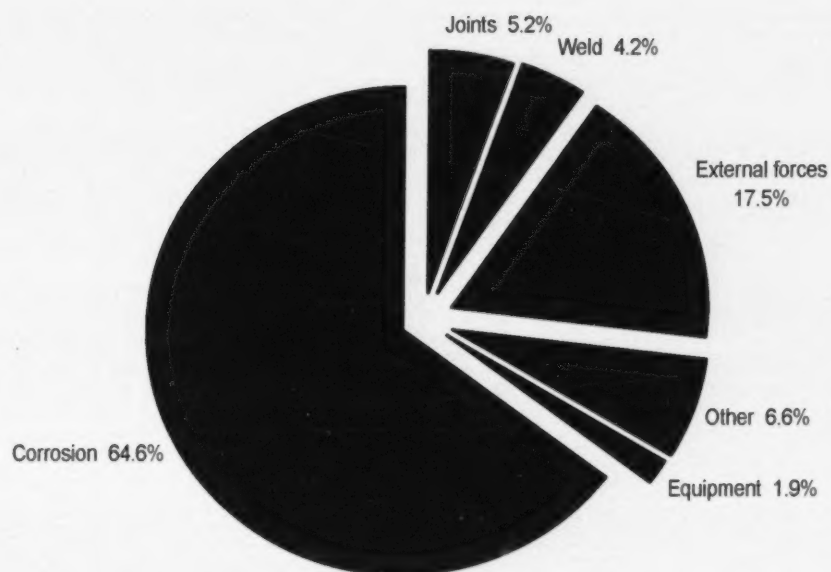


Figure 24. Distribution of failures by cause, 1998/99

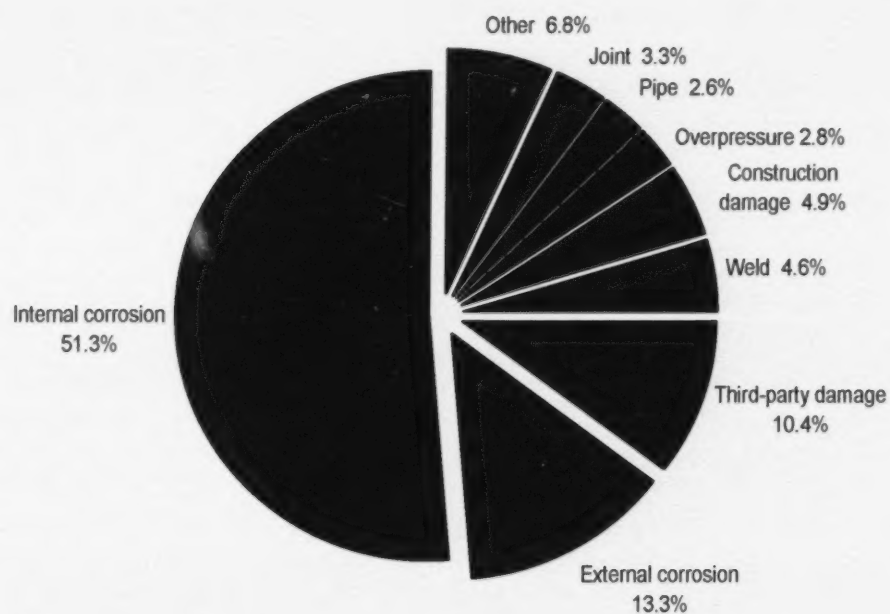


Figure 25. Distribution of failures by cause, 1980-1998/99

EUB Action

- The above are examples of actions to ensure that operators address an entire system, not just the line that failed. The EUB will continue this approach in future.

6.4 Pipeline Operations

EUB inspectors conducted 200 operations inspections on pipeline licences associated with 43 different company facilities, of which 105 were unsatisfactory and 15 were serious. Required upgrades were as follows:

- licence upgrades as per *EUB Guide 56: Energy Development Application Guide* (abandon, discontinue, transfer, etc.) (84);
- warning signs and emergency contact number replacement and/or installation (530);
- corrosion mitigation program started and/or upgraded systems (21); and
- *Operations Procedures Manual* and system mapping upgrades (27).

There were 15 pipelines shut down provincially due to unsafe operating conditions (e.g., licensed service [sweet to sour], overpressure [exceeding licence maximum operating pressure of valves, carrier pipe], hill stability or earth movement, degradation of pipe wall due to corrosion). The average downtime for each incident was three days.

EUB Action

- Enforcement action was taken in all cases of noncompliance, ranging from warnings to suspensions. EUB inspectors will continue this practice.

6.5 Pipeline Hits

There were 91 incidents of pipeline contact damage provincially, as shown in Figure 26. They resulted in 17 leaks, 25 ruptures, and 49 hits without product release.

Operator awareness and damage prevention seminars were held in each EUB inspection district to promote safety around pipeline facilities and rights-of-way. EUB staff also sponsored damage prevention seminars for construction groups involved with ground disturbances. These are required after a second contact incident. Ten companies were involved in more than one contact incident in 1998/99. Forty-eight seminars were held in 1998/99, with 1348 people in attendance.

Operator awareness presentations are conducted at work sites, such as during industry safety meetings where EUB staff review requirements. During 1998/99, 27 presentations were conducted, with 130 people in attendance.

6.5.1 General EUB Action on Problem Areas

EUB Action

- The EUB will continue to focus on educating parties who have been involved in pipeline hits in an effort to reduce the potential for future incidents.

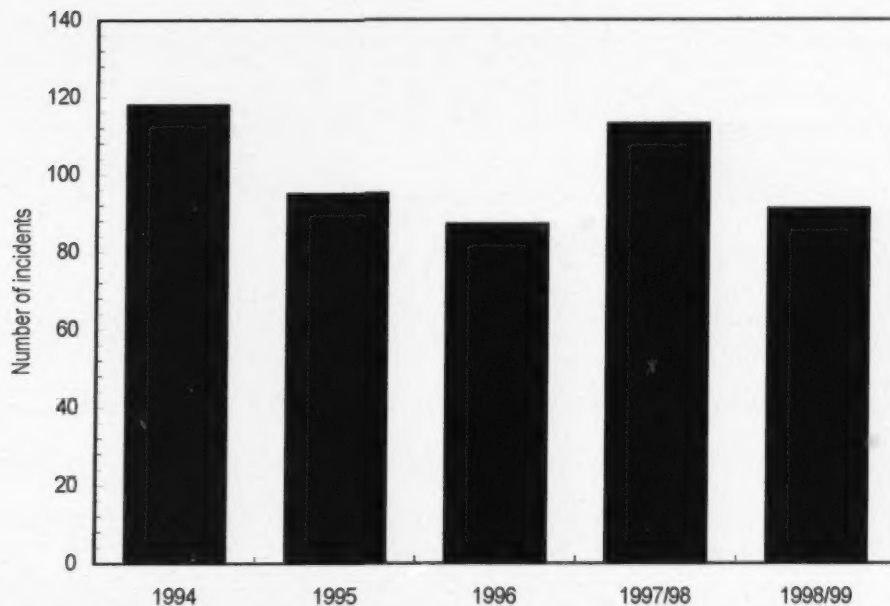


Figure 26. Provincial incidents of pipeline contact damage

The following four areas have been identified as key focus areas for EUB pipeline inspections.

1) Reducing Pipeline Failures

- Corrosion continues to be an area of focus due to the number of line or system failures. As part of the EUB process to investigate failures, a third-party evaluation of the failed pipe segments with no previous inspection history will be required. Recommendations from these assessments will be implemented to mitigate future occurrences of corrosion.
- Pipeline integrity program reviews will be performed during operations inspections to verify their effectiveness.
- The Pipeline Regulations adopted CSA Z662-96, Appendix E, as a mandatory requirement for leak detection on liquid pipelines in *GB 98-14: Pipeline Amendment Regulations*. These changes result in one standard regarding leak prevention and detection for liquid pipelines in Alberta. (For more information on pipeline performance in Alberta, see *EUB Report 98-G: Pipeline Performance in Alberta, 1980-1997*.)

2) Operations Inspections

- The number of discontinued and decommissioned lines identified during operation inspections has led the EUB pipeline team to focus on this area.
- The liability of these decommissioned pipeline facilities is of concern because non-core properties are disposed of during divestitures and restructuring.

- Submissions of licence transfers and amendments are not being given priority. This is resulting in inaccurate pipeline data as to ownership, signage, emergency contacts, operation status, and overall integrity of pipeline systems. The EUB will focus on rectifying these problems.

3) Damage Prevention

- Seminars will continue for high-risk groups involved in ground disturbance activities to educate workers about requirements and safety issues associated with their work. This will improve workplace safety, reduce the potential for public injury, and improve public confidence.

4) Compliance

- Under the Pipeline Act, the EUB has a mandate to ensure that pipelines are constructed in accordance with relevant regulations, codes, and standards. About 28 per cent of inspections conducted in 1998/99 resulted in unsatisfactory conditions. Working with operators to reduce the number of unsatisfactory inspections will continue to be a goal.
- There will be an increased emphasis on enforcement action for noncompliance with regulations, codes, and standards ranging from immediate shutdowns to clarification of requirements by EUB inspection staff. This will provide confidence that line failures due to improper construction practices will be reduced.

Section 7 Environment

7.1 Mobile Ambient Air Quality Monitoring

7.1.1 The EUB's General Approach to Monitoring

EUB field staff operate a mobile ambient air quality monitoring unit currently equipped with hydrogen sulphide and sulphur dioxide analyzers, as well as equipment to electronically measure wind speed and direction. This equipment allows EUB staff to conduct mobile and stationary monitoring throughout the province.

Mobile monitoring involves having the unit manned and operated in a manner that can detect, monitor, and evaluate emissions from a facility. If fugitive emissions are detected, the unit's mobile capabilities allow the operator to track the plume to obtain representative air samples and determine the location of the source.

Stationary monitoring refers to setting the unit in a static position, usually unmanned, for a period of more than six hours. Stationary monitoring is conducted to detect emissions that may occur intermittently at a given location, for example, setting the unit on the property of a resident who has registered an odour complaint with the EUB.

Mobile and stationary monitoring may be performed when a complaint is registered and is also carried out routinely based on a yearly plan developed by each of the Field Centres. Use of the monitoring unit is coordinated out of the Calgary Field Centre. In total the EUB mobile monitoring unit spent 121 days in the field during 1998/99.

Response to Odour Complaints

The monitoring vehicle responded to 73 odour complaints during 1998/99. Of these, the unit detected fugitive emissions at 55 facilities. Operators of 25 of the 55 facilities were able to resolve their emission problems immediately. The other 30 required time to resolve the problems and field staff followed up with the operators to ensure that this work had been done within a reasonable time frame. Figure 27 shows the provincial distribution of complaints responded to with the EUB's mobile monitoring unit.

EUB Action

- Facilities that were the source of experienced odour problems will be considered for routine monitoring during the 1999/2000 year.

Routine Monitoring, Suspensions, and Emergency Response

Each Field Centre created a list of facilities for routine air quality monitoring for the 1998/99 reporting year based on the following criteria:

- newly constructed sour facilities
- new operators/licensees of sour facilities
- facilities with a history of problems

In 1998/99 EUB staff monitored 92 facilities. Emissions violations occurred at 16 of these, or 17 per cent. Operators of all facilities where emission problems were encountered were notified and required to immediately resolve the problem.

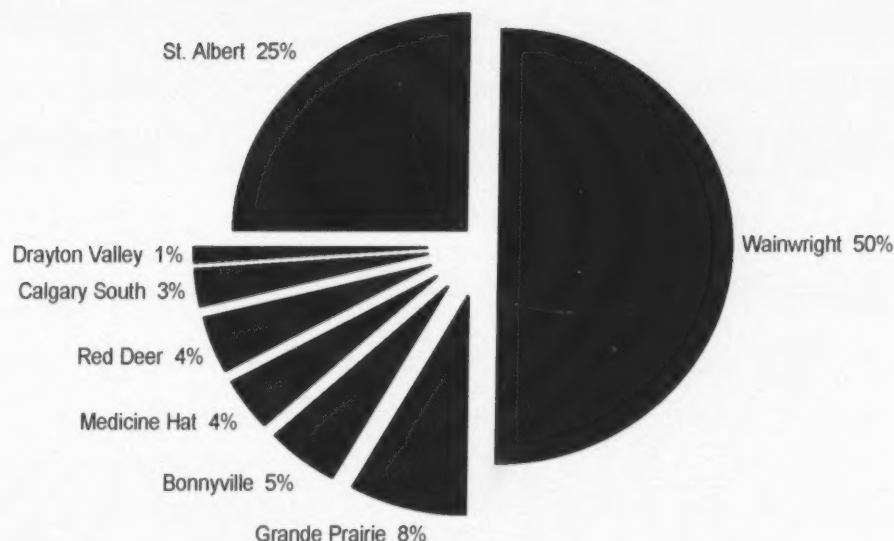


Figure 27. Distribution of monitoring unit response to odour complaints, 1998/99

Based on unacceptably high air quality readings recorded by the monitoring equipment, three facilities received operational suspensions. They were not allowed to resume operation until they took remedial action and follow-up monitoring was conducted.

As well as conducting routine monitoring and responding to complaints, the EUB mobile monitoring unit may become involved in emergency response situations. In 1998/99 the unit was placed on standby for one well control situation in the Drayton Valley area. However, monitoring was not required because the well was brought under control.

EUB Action

- The EUB will continue to use the criteria outlined to identify and prioritize facilities for routine air quality monitoring.
- The EUB is confident that a continued cooperative approach will result in immediate resolution of the issues at hand and that greater attention to preventive maintenance will yield long-lasting improvements.

7.2 Spills and Releases

7.2.1 Total Spills and Releases

The EUB's goal is to minimize future spills and releases by working cooperatively with industry and other regulators to proactively prevent incidents. When a spill occurs, it is important that it be reported to the EUB in accordance with requirements. This allows for an appropriate, timely, and effective response to minimize environmental and public impacts.

The EUB's use of a priority system ensures consistent and effective inspections of release events:

- Priority 1 releases pose serious environmental and public impacts and are responded to immediately.
- Priority 2 releases are generally mid- to high-volume releases but can include low-volume spills where the operator is new or has a poor response history. These releases are generally responded to within one working day.
- Priority 3 releases are generally low-volume spills but could include higher-volume spills where the operator history is good. Priority 3 releases would not be routinely inspected but may be randomly audited.

A five-year comparison of the number of liquid spills is provided in Figure 28. As shown, in 1998/99 a total of 1354 liquid releases were reported to the EUB's eight Field Centres, a decrease from 1443 similar releases in the previous year. Of those,

- 43 were priority 1 (3 per cent),
- 370 were priority 2 (28 per cent), and
- the remaining 941 were priority 3 (69 per cent).

EUB Action

- The EUB believes that many of the causes of liquid spills can be reduced by improving maintenance and corrosion control programs and continues to work with industry towards that goal.

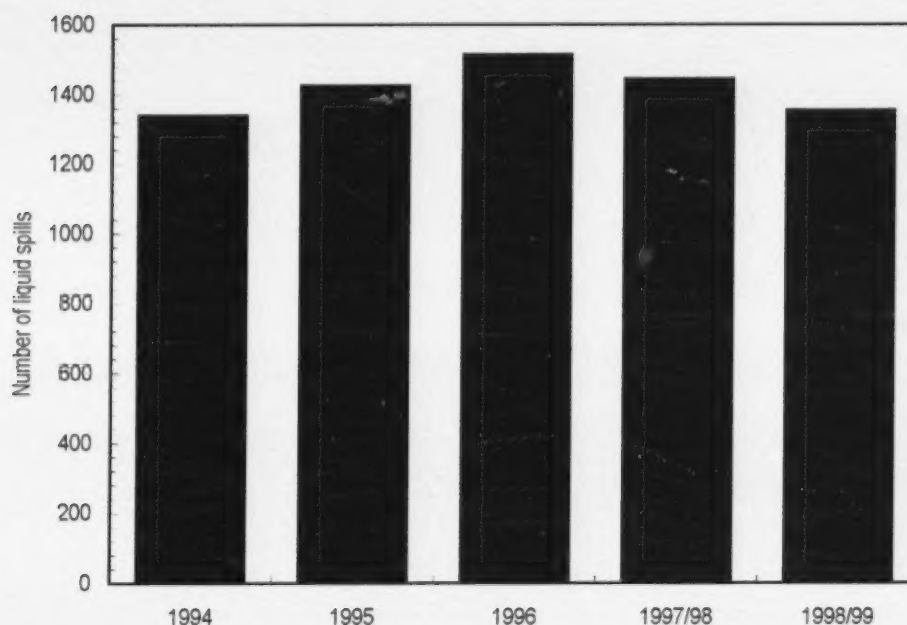


Figure 28. Number of liquid spills from pipelines and other upstream oil and gas sources

7.2.2 Main Causes of Releases, Reporting, and Prevention

Equipment failure, corrosion, and operator errors were the leading causes of liquid releases in 1998/99. Other sources include trucks, trucking facilities, central treating facilities, and drilling waste sumps. Figure 29 shows the most significant sources and causes.

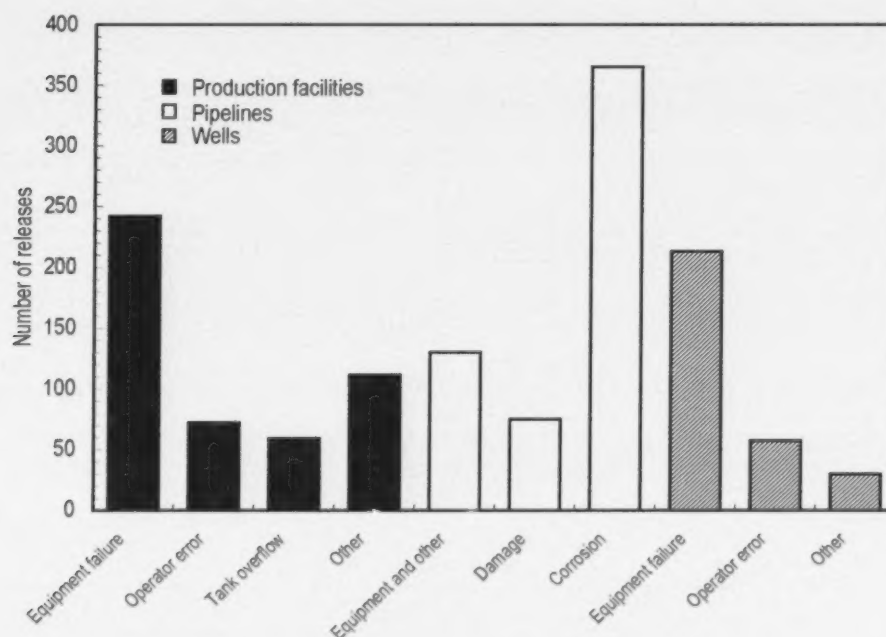


Figure 29. Liquid releases by source and cause, 1998/99

Figure 30 gives the volume of oil and produced water spills over a five-year period. Spill volumes for oil remained relatively the same, while produced water volumes decreased. Figure 31 presents the distribution of liquid spills by EUB Field Centre.

Through awareness, education and, as necessary, enforcement action, the EUB's goal is to reduce the number of spill occurrences and to minimize impacts from spills that do occur. The EUB believes that oil spill response training exercises ensure that industry personnel are adequately trained to effectively respond to spills and therefore minimize the impact on the environment and the public.

In 1998/99, EUB staff attended 22 oil spill cooperative training exercises and, upon request by the oil spill cooperative, gave presentations including

- release statistics,
- release reporting requirements, and
- regulatory changes and updates.

Such presentations have a provincial focus but are also tailored to address local issues and concerns. Field staff received positive feedback regarding their involvement.

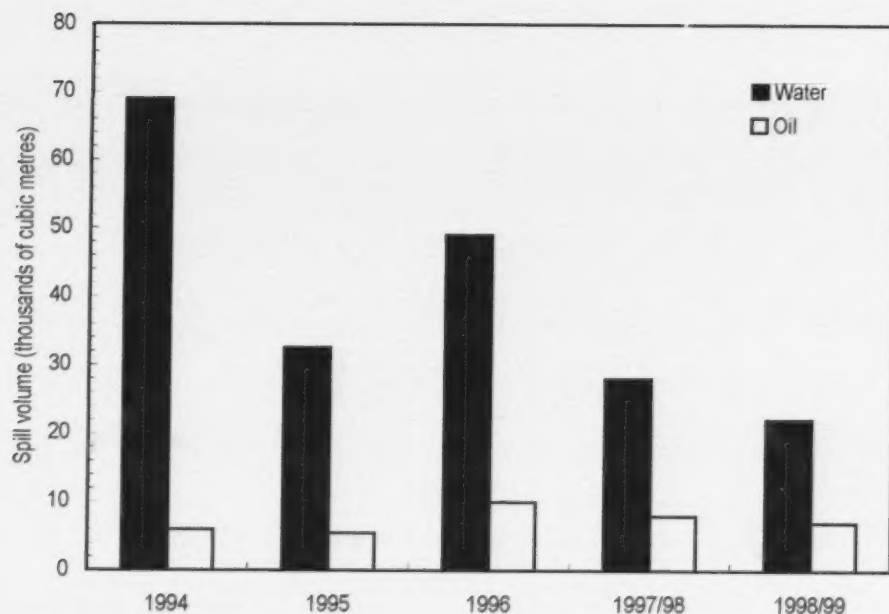


Figure 30. Reported volumes of oil and produced water spills

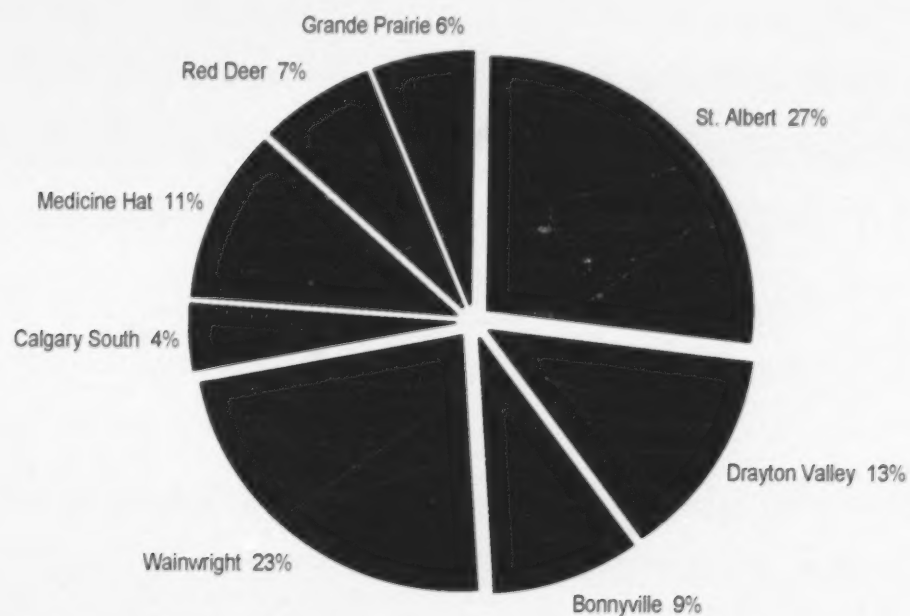


Figure 31. Distribution of liquid spills by Field Centre, 1998/99

EUB Action

- By tracking the causes of spills, industry and the EUB can focus on areas that require the greatest attention. Figure 29 indicates that industry must be more effective with their preventive maintenance programs to address corrosion and equipment problems.
- The EUB welcomed the opportunity to participate in future oil spill exercises and is available to present this information to individual companies that feel it may be of value to their organization.

7.3 Waste Management Initiatives

7.3.1 Waste Management Facilities

Since the introduction of *Guide 55: Storage Requirements for the Upstream Petroleum Industry* in 1995 and *Guide 58: Oilfield Waste Management Requirements for the Upstream Petroleum Industry*, field staff have played a limited role in ensuring that industry was complying with the requirements. In 1998, oilfield waste management took on an expanded role within the EUB with the creation of a Waste Inspection and Audit Team.

In the first half of 1998 field staff drafted an *Oilfield Waste Management Facility Inspection Manual*. The manual establishes protocols for inspections and audits of waste management facilities. Later in 1998 the manual was introduced to all field staff and training on inspection procedures began.

Fourteen of the 38 approved third-party waste management facilities were inspected. Results from the inspections revealed that 13 of the 14 facilities required remedial action in order to meet minimum provincial requirements. The most common deficiencies found at these facilities were minor and involved housekeeping matters, such as small spills or staining on lease that were not cleaned up. Enforcement action was taken in all cases of noncompliance at the facility and at the corporate level as necessary. The level of enforcement action varied depending on the severity of the infraction.

EUB Action

- The Waste Inspection and Audit Team found many operators of waste management facilities to be reactive, rather than proactive, in resolving problems at facilities. As a result, the team has scheduled inspections of all approved waste management facilities and is conducting selected audits. The inspections and audits are scheduled to be complete by the middle of 1999. Once the information is reviewed, the final version of the inspection manual will be written.

7.3.2 Drilling Waste Management

In 1996 the EUB issued *Informational Letter 96-13* and a revised *Guide 50: Drilling Waste Management*, identifying the three agencies responsible for regulating Alberta's waste management:

- EUB – private land,
- Public Lands (AFRD) – public land white area, and
- Land and Forest Service (AEP) – public land green area.

In 1998/99 these agencies worked together to complete a common document used by all three jurisdictions to consistently audit drilling waste management. In early 1999 a Drilling Waste Audit team was formed to further develop specific auditing processes for the EUB.

In 1998/99 the EUB's Field Centres conducted 1011 drilling waste management inspections. Consistently applied selection criteria allowed the EUB to concentrate on higher risk disposal types and specific areas of concern. The EUB inspections found 168, or approximately 17 per cent, of all drilling waste management facilities to be unsatisfactory. In response to the gaps found by the EUB's audits and inspections, the EUB is increasing its inspections and audits of drilling waste disposals.

EUB Action

- All operators are expected to be aware of and abide by the requirements in *Guide 50*. Depending on the significance of the unsatisfactory item(s) uncovered, an EUB inspector may choose to educate the operator about EUB requirements or apply more stringent enforcement action(s).
- A provincial inventory of invert land treatment sites has been created and an inspection schedule will be initiated in 1999/2000.

Section 8 Surface Casing Vent Flow/Gas Migration

8.1 Changes in Requirements for 1998/99

EUB *Interim Directive 99-3: Surface Casing Vent Flow/Gas Migration (SCVF/GM) Testing and Repair Requirements* was released in 1999. The new policy allowed the EUB to better focus its inspection activities on a go-forward basis. *ID 99-3* outlined the following changes to requirements:

- EUB preapproval is not required for routine repair of SCVF/GM problems,
- SCVF production approval criteria are outlined,
- new wells drilled must be checked for SCVF/GM within 90 days of rig release,
- post-notification is required when a SCVF/GM repair program is completed,
- test frequency of wells with five years of nonserious SCVF/GM data is modified, and
- EUB auditing and enforcement process for testing and repair of SCVF/GM problems is stronger.

In addition, the EUB released *General Bulletin 99-6: Application of Stable Carbon Isotope Ratio Measurements to the Investigations of Gas Migration and Surface Casing Vent Flow Source Detection*. The steering committee of the Stable Carbon Isotope Gas Migration Research Program developed a method, based on stable carbon isotope ratios, to aid in determining the source of gas migration. Industry has struggled with locating the actual source of low pressure/rate/volume SCVF and GM problems using conventional methods. The committee found that stable carbon isotope ratios, along with other tools, represent a reliable technique for determining SCVF/GM sources.

8.2 Inventory and Activity Levels

The SCVF/GM provincial inventory increased in 1998/99 as a result of greater industry awareness of SCVF/GM testing and reporting requirements (see Tables 8 and 9). There are now 3810 wells with active SCVF and 814 with GM problems in Alberta, compared to 3613 with SCVF and 807 with GM in 1997/98.

Table 8. Surface casing vent flows

Year	Serious	Nonserious	Total
1995	393	3121	3514
1996	75	3103	3178
1997/98	76	3537	3613
1998/99	139	3671	3810

Table 9. Gas migration problems

Year	Serious	Nonserious	Total
1995	4	596	600
1996	6	809	815
1997/98	6	801	807
1998/99	1	813	814

The number of vent flows resolved in 1998/99 totalled 255. This included 172 that died out, 81 that were repaired, and 2 that were closed by the EUB. Of the 139 serious SCVF remaining at year-end, 77 were being repaired, 58 were producing into a closed system, and 4 were deferred until well abandonment.

The SCVF/GM Team selected for audit 227 companies that had drilled 10 wells or fewer in 1997/98. The companies were required to submit SCVF/GM test data sheets confirming that new wells drilled were tested within 30 days of rig release. Test data sheets were to be kept on file and available to the EUB upon request. Ninety-two per cent of the companies were not aware of the testing requirement. However, after initial discussion, they complied with the request. The final result was 100 per cent compliance, and the closure/abandonment order process was avoided.

EUB Action

- The EUB will continue to provide a process that ensures that industry is aware of and accountable for meeting SCVF/GM requirements to reduce the number of SCVF/GM problems.

Section 9 Packer Isolation Testing and Reporting

9.1 Introduction

The EUB's packer isolation testing and reporting program aims to

- maintain the integrity of wells that require packers for environmental reasons,
- improve industry awareness, understanding of, and compliance with requirements, and
- apply firm and fair enforcement.

9.2 Inspection Results

Fiscal year 1998/99 started with an inventory of 7667 wells that needed testing and reporting under EUB requirements. As of 31 March 1999, virtually all of these wells had been tested, repaired, properly suspended, or abandoned. The results of this program are shown in Table 10.

Industry compliance with the testing and reporting requirements remained high in 1998/99. However, the increase in "notice of suspension letters issued" and "repeat companies being issued closure orders" was likely due to the large volume of transfers. New licensees may not have been aware of the requirements or of whether the test had been conducted and submitted by the previous licensee.

EUB Action

- The EUB will focus on improving communication among all stakeholders, which is essential to the continued success of the program.

Table 10. Packer isolation testing and reporting program results

	Notice of suspension letters issued		Closure orders issued		Repeat companies for closure	Abandonment orders issued	
	Companies (no.)	Wells (no.)	Companies (no.)	Wells (no.)	Companies (no.)	Companies (no.)	Wells (no.)
1995	n/a	n/a	51	172	n/a	20	34
1996	n/a	n/a	137	446	24	1	1
1997/98	90	180	15	23	3	1	1
1998/99	128	443	22	34	6	2	2